Types OF Chemical Reactions

1. Formation Reactions
(aka Combination)

$Zn^{2+}S^{2-}$

A + B → AB

element + element → Compound

Ex: $8Zn(s) + S_{8(s)} \rightarrow 8ZnS(s)$

zinc + sulfur → zinc sulfide

$Hg^{2+}O^{2-}$

2. Simple Decomposition

compound → element + element + ...

AB → A + B

$2HgO(s) \rightarrow 2Hg(l) + O_2(g)$

Mercury(II) oxide → mercury + oxygen

p 331 13, 14

p 332 15, 16

Do p 331 #13, 14 (Not necessary to balance yet)
and p 332 # 15, 16 (Not necessary to balance yet)

Single Replacement Reactions

p339

element + compound →

m + nonm

A + BC → B + AC if A is a metal

Or

A + BC → C + BA if C is a non-metal

diff + m+nm

Double Replacement Reactions

Compound + compound → Comp. + Comp.

AB + CD → CB + AD

m+nm + m+nm

Common Oxides

Substance Burning	Common Oxide(s)
carbon	$CO_2(g)$
Hydrogen	$H_2O(g)$
Sulfur	$SO_2(g)$
Nitrogen	$NO_2(g)$
Metal Pb^{2+} Mn^{2+} V^{5+}	$PbO(s)$, $MnO(s)$, $V_2O_5(s)$
Methane $CH_4(g)$	$CO_2(g)$, $H_2O(g)$
Propane $C_3H_8(g)$	$CO_2(g)$, $H_2O(g)$
Ethanol $C_2H_5OH(l)$	$CO_2(g)$, $H_2O(g)$

Examples of combustion

$2C_4H_{10}(g) + 13O_2(g) \rightarrow 8CO_2(g) + 10H_2O(g)$

$C_3H_7OH + 4.5O_2(g) \rightarrow 3CO_2(g) + 4H_2O(g)$

1 + 9 = 10

2 9 6 8

$2Mn(s) + O_2(g) \rightarrow 2MnO(s)$

$Mn^{2+}O^{2-}$

For thurs

p337 20, 21

P 329

#12. a) $4SO_2(g) + 2O_2(g) \rightarrow 4SO_3(g)$

b) $1Fe_2O_3(s) + 3H_2(g) \rightarrow 2Fe_{(s)} + 3H_2O(l)$

c)

d) 4 5 1 — 2 1 2

P 331 $Be^{2+}\ O^{2-}$

13. $2Be(s) + O_2(g) \rightarrow 2BeO(s)$

Form/Comb

14. $3Mg(s) + N_2(g) \rightarrow Mg_3N_2(s)$

Form./comb.

P 332 decomp.

15. $2HI(aq) \rightarrow H_2(g) + I_2(s)$

16. $2HBr(aq) \rightarrow H_2(g) + Br_2(l)$

Practice Problems Answers

20. a. $2HCOOH + O_2 \rightarrow 2CO_2 + 2H_2O$

b. $C_7H_{16} + 11O_2 \rightarrow 7CO_2 + 8H_2O$

21. $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$

3. Sealed flask 392 g of $Al(OH)_3$

a) mol n = 5.02 mol — 1 Al, 3 O, 3 H

b) 5.02 mol x 3 x 1.0 g/mol

b) mass of H 15.21 g

c) mol of O 15.06 mol

d) atoms of Al 3.02×10^{24} atoms

e) total # of atoms 2.12×10^{25} atoms

More Combustion Practise

- a) $CH_4(g) + O_2(g) \rightarrow$ (4, 7, 4, 6)
- B) $2CH_3NO_2(l) + 3O_2(g) \rightarrow 2CO_2(g) + 3H_2O(g) + 2NO_2(g)$ (4 + 7; 4, 11)
- C) octane + oxygen →
- D) $2C_2H_5SH(g) + 9O_2(g) \rightarrow 4CO_2(g) + 6H_2O(g) + 2SO_2(g)$

How to recognize which type?

- Look at the **reactants**:

E + E = Combination / formation / synthesis

C = Decomposition

E + C = Single replacement

C + C = Double replacement

C_xH_y or C_xH_y OH + O_2--> Combustion

note: E means element C means compind